



# Changes in Traffic Patterns and Localized Air Quality during Stay-At-Home Orders

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# Motivation

## Traffic reductions in South Coast

### 1. Regional differences

Greater reductions in average VMT were observed in Orange, Ventura, and Los Angeles Counties

### 2. Trends over time

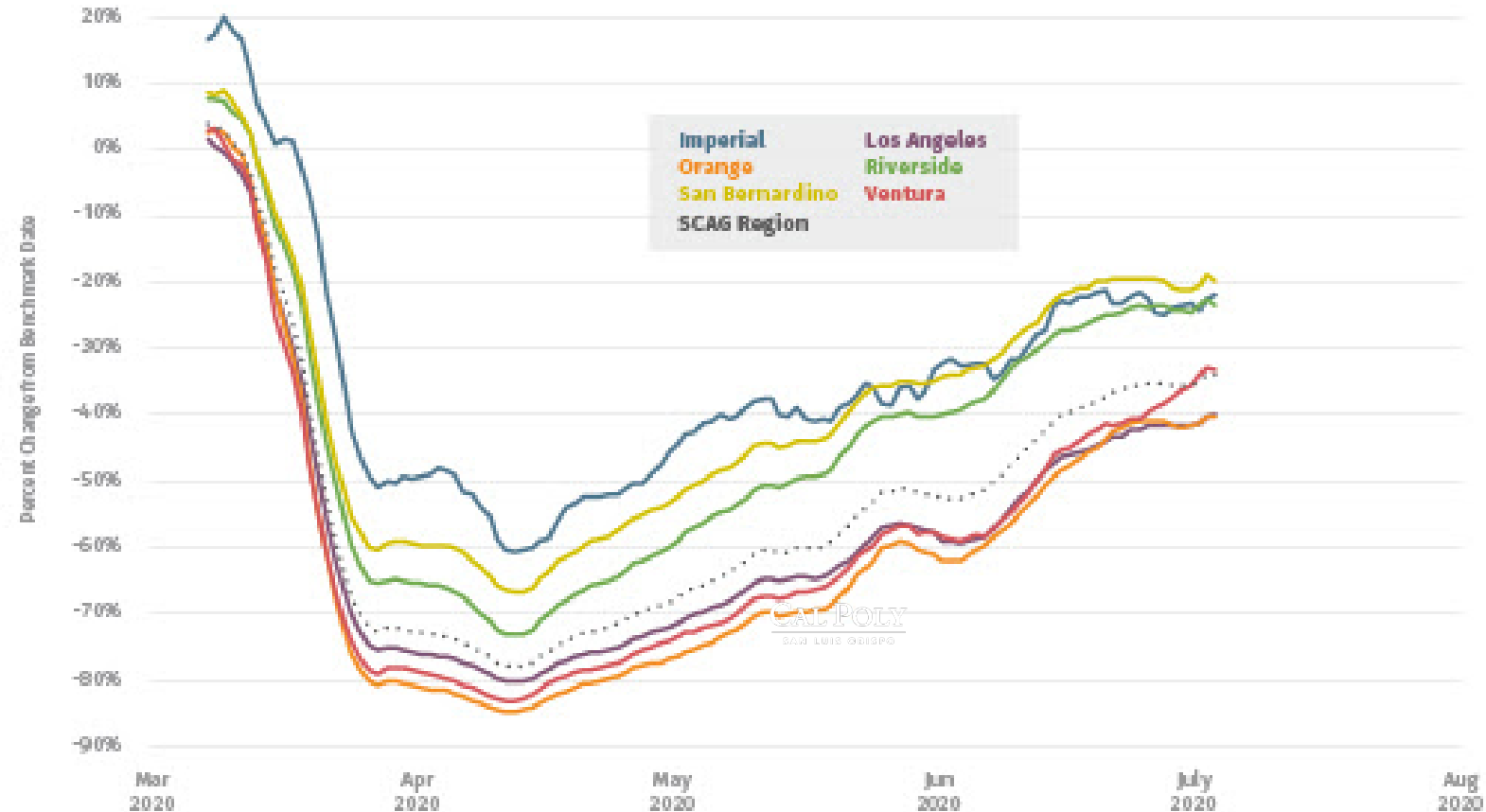
Peak traffic reductions were observed in mid-April, and are rebounding toward pre-COVID levels

### 3. Current levels

Current traffic levels have not fully returned to pre-COVID levels

## Southern California Association of Governments Snapshot of COVID-19 Transportation Impacts in the SCAG Region

Percent Change In 7-Day Moving Average VMT by County (using January 2020 as benchmark)



# Data and Methods

## Traffic Flow

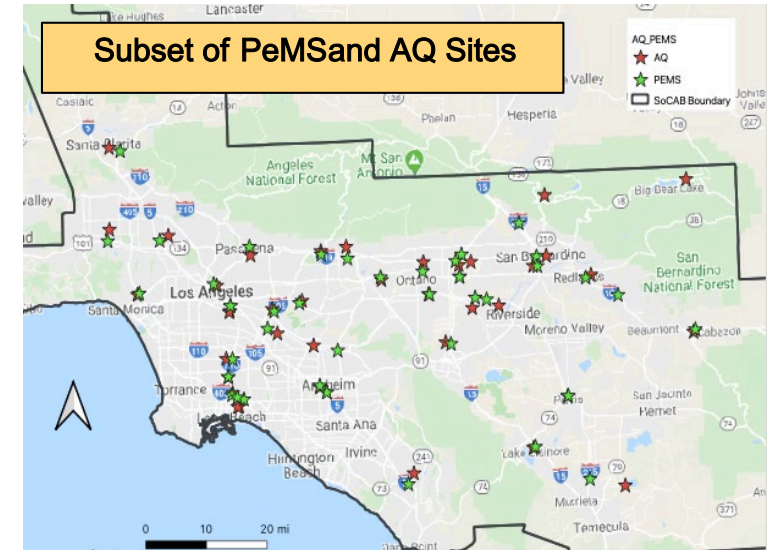
- CalTrans PeMS system
- Traffic flow and speed
- Threshold: >80% active
- Weekdays (T-Th) Peak Traffic
- Baseline: Jan & Feb 2020

## Air Quality Trends

- Hourly CO and Nox
- CARB – AQMIS System
- 4 Near Road and 16 Non-near Road Sites
- Baseline: 2017-2019 average diurnal profile

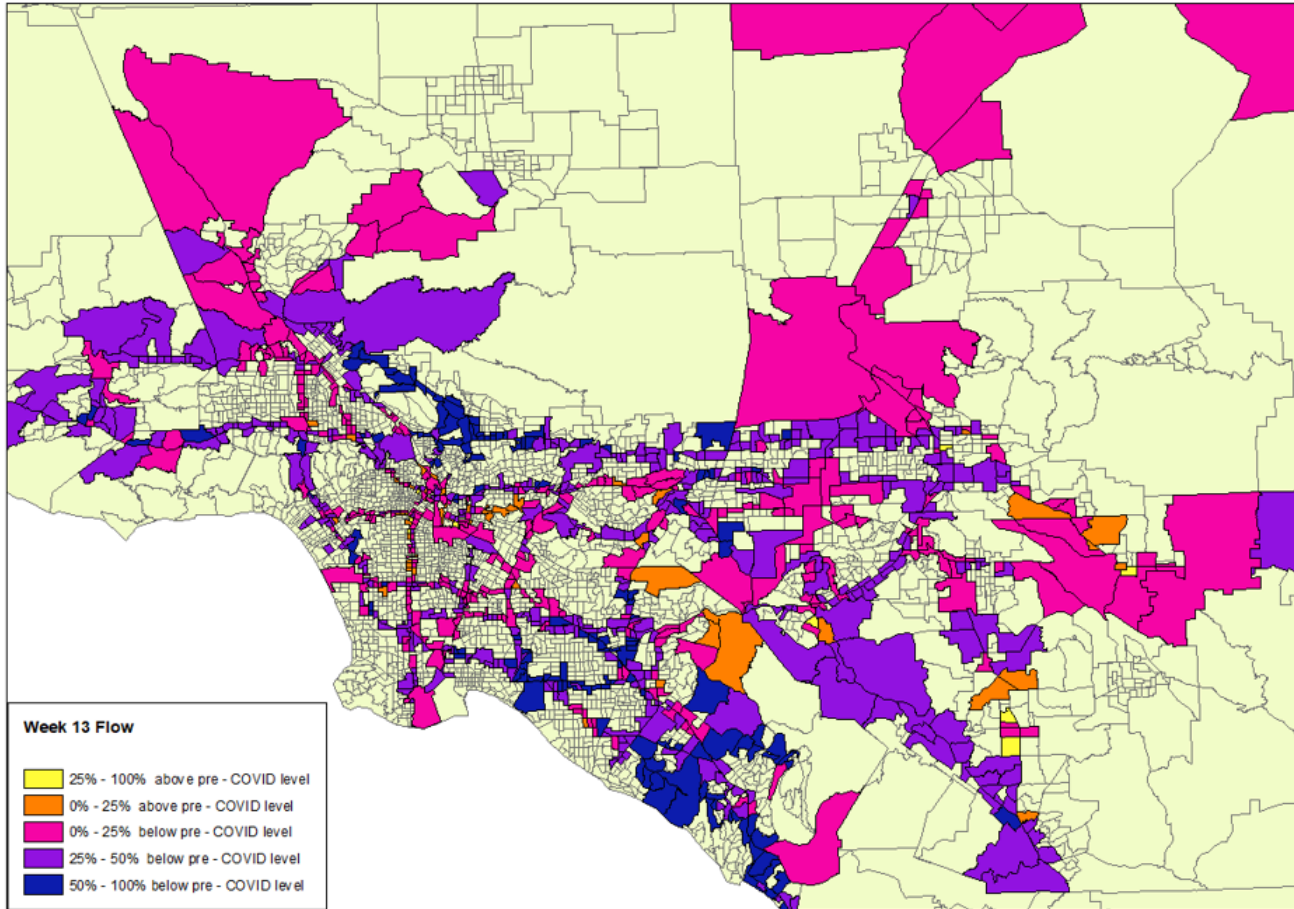
## Environmental Justice

- 2018 CalEnviroScreen (CES) 3.0 Score by CalEPA
- Census tract based

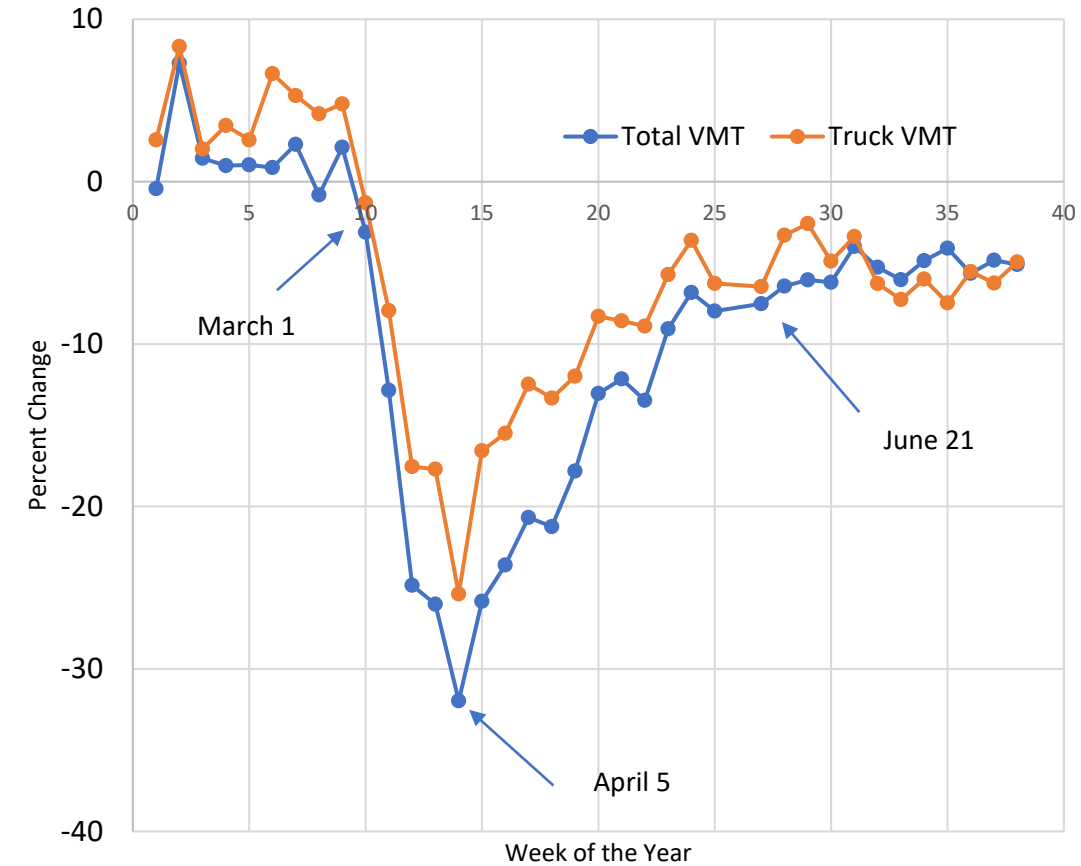


# Traffic Flow Drops In The First Week of Shutdown

March 22 - March 28 Total Flow Change



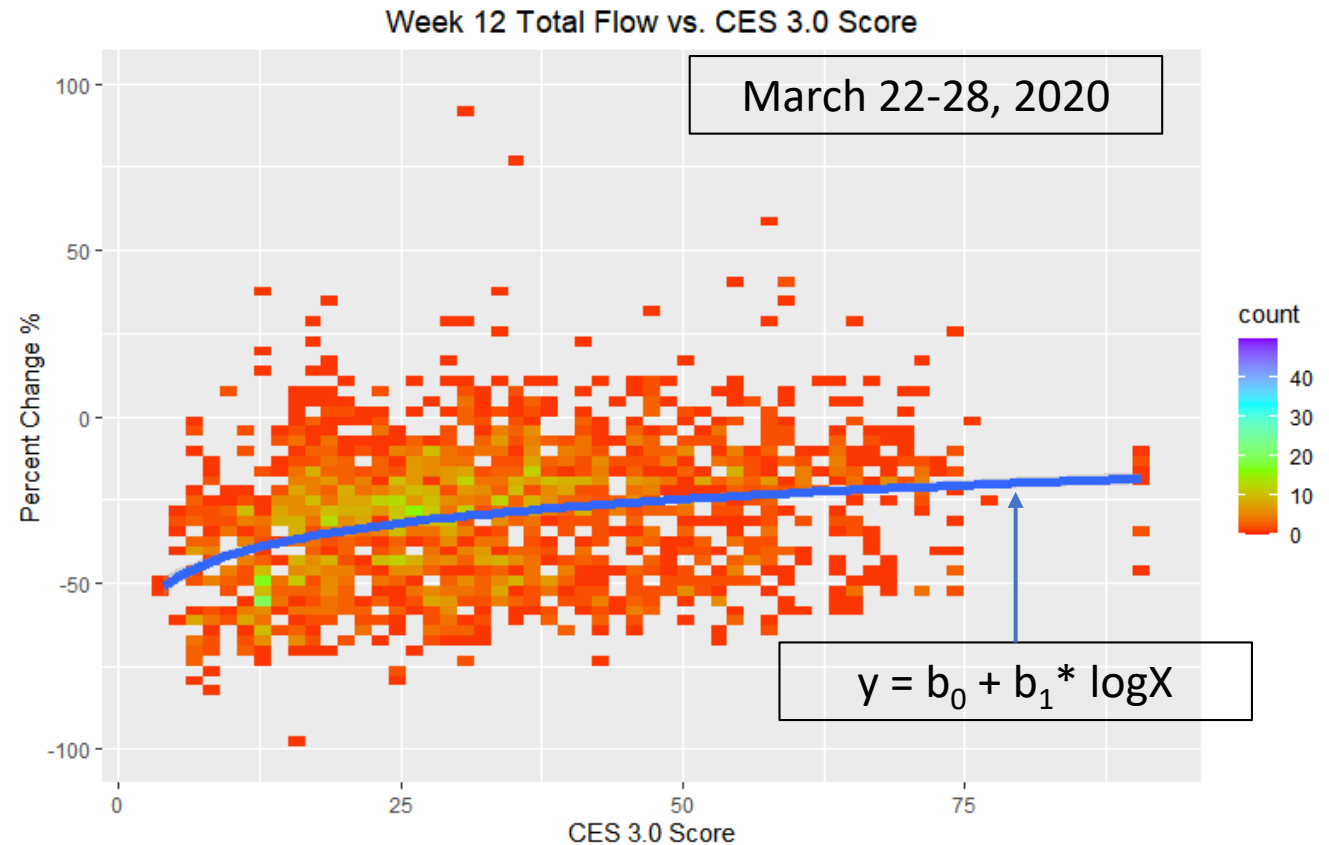
District 7 – Drop In Vehicle Miles Traveled



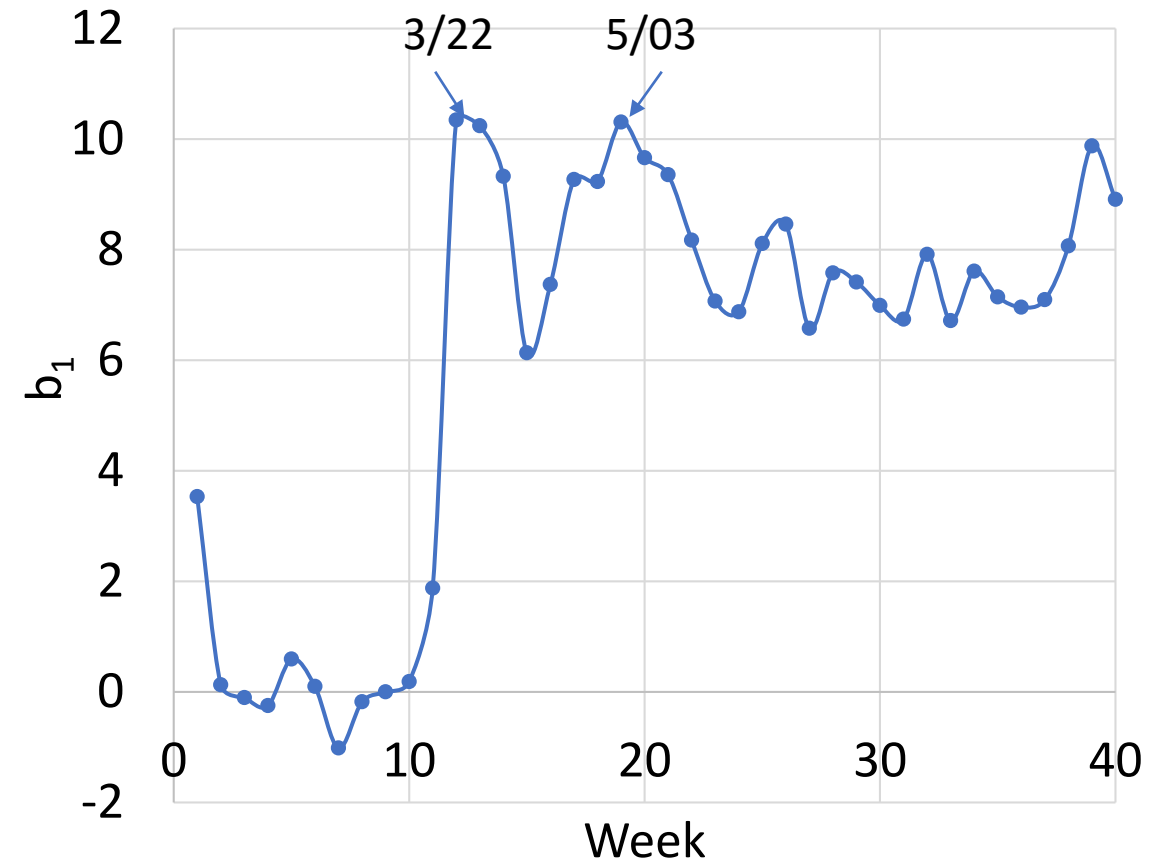
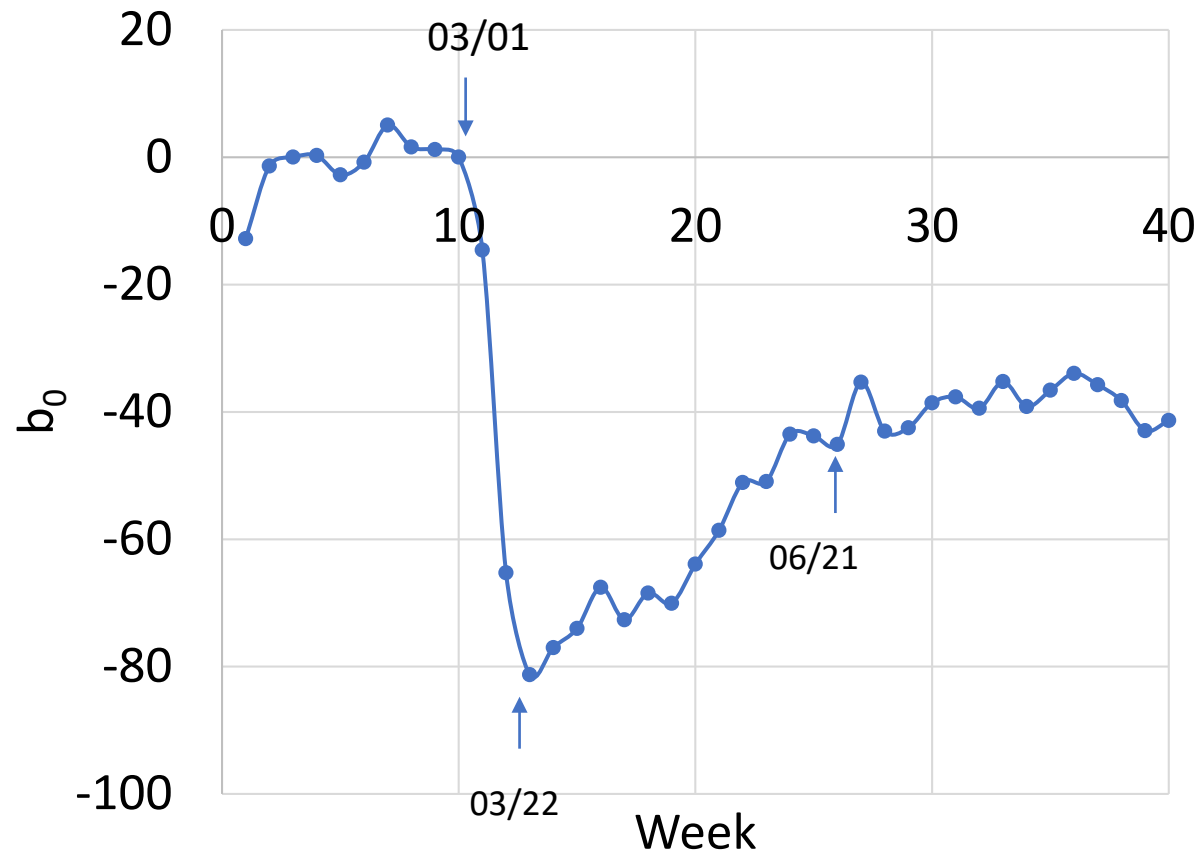
Most census tracts being mapped see a drop of 25% to 100%, increasing by the week until May

# Environmental Justice of COVID Shutdown

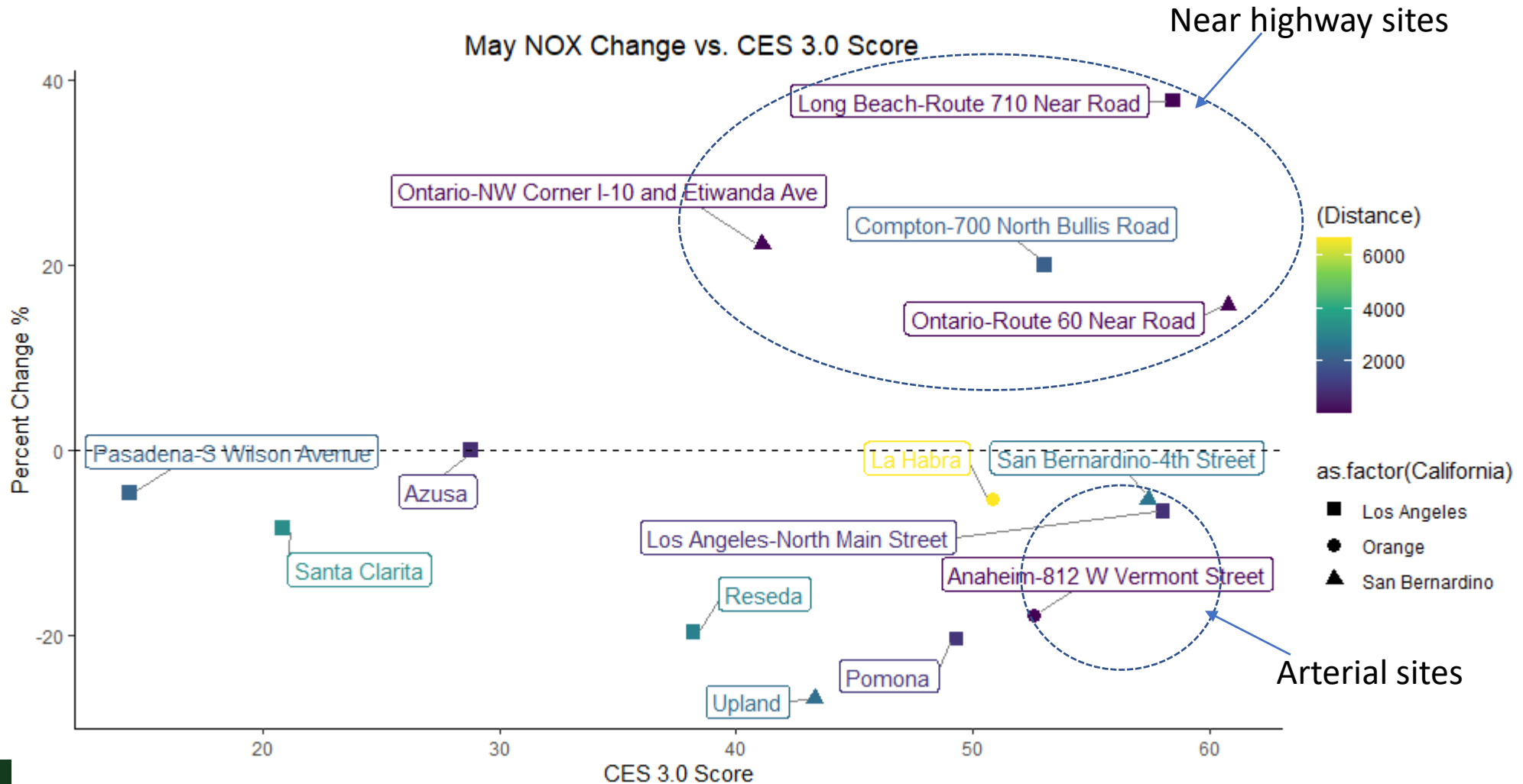
- Traffic flow changed differently in different census tracts.
- *High CES Score* > More vulnerable population in terms of socio-economic and environmental exposure.
- *Low CES Score* > Less disadvantaged
- Spatial distribution of traffic flow reduction favored low CES areas



# Temporal Progression of Environmental Injustice



# Environmental Justice: NO<sub>x</sub> vs. CES 3.0 Score



# Potential Policy Implications



## Telecommuting

- Access to 'remote work' for EJ communities restricted by nature of jobs and technology
- Additional targeted incentives required for businesses



## E-Commerce

- More consumption of online shopping items means more 'Warehousing' activity
- Need to manage additional trucking activities in the Inland regions





# Conclusions

## What have we learned?

### 1. Traffic shifts are locally variable

From PeMSdata, declines in traffic flow (vehicles/hour) were observed over the entire South Coast Air Basin. However, flow recovered at different times and scale for different localized regions.

### 2. Near-road pollution captures traffic trends

Near-road monitoring locations saw up to 50% reductions in CO and 40% reductions in NOx. Non -near-road locations also saw reductions in CO and NOx.

### 3. Environmental justice impacts

While flow decreases were generally more substantial for locations with low CES score, air pollution reductions were not linearly associated with CES score.

### 4. Future work

We will find the underlying reason for flow reduction – more telecommuting or e -commerce activities?



# Acknowledgments

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